

# CI DOS-97 ABSTRACT SUBMITTAL FORM

## CLOUDSAT: A SPACECRAFT TO MEASURE THE VERTICAL STRUCTURE OF CLOUDS

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### ABSTRACT

CloudSat is a space-based approach for measuring the vertical structure of clouds. This mission is designed to provide key observations to improve parametrization of clouds and cloud-climate feedbacks for global circulation models (GCMs). Originally developed for the cost-constrained NASA Earth System Science Pathfinder (ESSP) spacecraft series, the proposed instrument payload consists of a 94 GHz cloud profiling radar (CPR), an A-band spectrometer/visible imager (ABSI), and a millimeter-wave and submillimeter-wave cloud ice radiometer (CLIR). The CPR radar will determine the vertical structure of multi-layer clouds with a resolution of 500 meters. ABSI detects very thin clouds and aerosol layers as well as acquires images of the local cloud field. CLIR exploits a new passive technique for retrieving cirrus ice content and mean crystal size. These three instruments share a 1 km footprint and detect clouds with optical depths as low as 0.1 to 0.3. (The actual depth depends on the size distribution of the cloud droplets or crystals.) This sensitivity allows cirrus ice mass to be determined with an accuracy of 10% and allows calculation of cloud-related radiative heating to within 1 K/km-day which is consistent with the observational requirements of the Tropical Rainfall Measuring Mission (TRMM). To provide a context for the cloud measurements the imager has been designed with a 25-km field of view. This capability will generate a record of cloud morphology concurrently with cloud profile measurements. The CloudSat instrument payload could furnish an important technology demonstration for future scientific, civilian, and tactical forecast systems. CloudSat will be a valuable research tool, filling a gap in planned climate observation systems.

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